

FINAL PROJECT

**ANALYSIS OF
HYDROCARBON TREATING SYSTEM
TO THE EMISSION OF SPARK-IGNITION
FOUR-STROKE ENGINE**



RESEARCH PAPER

**Submitted as a Partial Fulfillment of the Requirements for Getting
the Bachelor Degree of Engineering in Automotive Department**

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July 2011**

DECLARATION OF RESEARCH AUTHENTICITY

I assert verily that the research entitles:

ANALYSIS OF HYDROCARBON TREATING SYSTEM TO THE EMISSION OF SPARK-IGNITION FOUR-STROKE ENGINE

That made to fulfill some of requirements to get Bachelor Degree of Engineering in Automotive Department of Muhammadiyah University of Surakarta, as far as I know is not a plagiarism of a research that has been published, except the information source that to solve the problems.

Surakarta, July 2011
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(Ir. Sartono Putro, MT.)

DEDICATION

This Research paper is dedicated to:

Allah SWT,

Thanks for the best everything that You have given for me and thanks for Your love that always make me to never give up to do the best. I believe that You will always give me the best for everything.

My beloved Mom and Dad,

Thanks for your prayer, love, support and affection.
You always give me happiness but often I made you disappointed.
I am sorry and I promise to give you the best in the future.

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Thanks for your supports.
It is make me strong to get something more and more.

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All my friends,
Thanks for your supports and love me.

MOTTO

فَإِنَّ مَعَ الْعُسْرِ يُسْرًا ﴿٥﴾ إِنَّ مَعَ الْعُسْرِ يُسْرًا ﴿٦﴾

[5] For indeed, with hardship [will] be ease, [6] Indeed, with hardship [will be] ease (Al-Insyirah: 5-6)

فَمَنْ يَعْمَلْ مِثْقَالَ ذَرَّةٍ خَيْرًا يَرَهُ ﴿٧﴾ وَمَنْ يَعْمَلْ مِثْقَالَ ذَرَّةٍ شَرًّا يَرَهُ ﴿٨﴾

[7] Then shall anyone who has done an atom's weight of good, see it! [8] And anyone who has done an atom's weight of evil, shall see it.

(Al-Zalzalah: 7-8)

وَإِذْ تَأَذَّنَ رَبُّكُمْ لَئِنْ شَكَرْتُمْ لَأَزِيدَنَّكُمْ^ط وَلَئِنْ كَفَرْتُمْ إِنَّ عَذَابِي لَشَدِيدٌ ﴿٧﴾

[7] "And remember! Your Lord caused to be declared (publicly): "if ye are grateful, I will add more (favours) unto you; but if ye show ingratitude, truly My punishment is terrible indeed." (Q.S. Ibrahim: 7)

لَهُمْ مُعَقِّبَاتٌ مِّنْ بَيْنِ يَدَيْهِ وَمِنْ خَلْفِهِمْ يُحَافِظُونَهُ^ق مِنْ أَمْرِ اللَّهِ إِنَّ اللَّهَ لَا يُغَيِّرُ مَا بِقَوْمٍ حَتَّىٰ يُغَيِّرُوا مَا بِأَنْفُسِهِمْ^ق وَإِذَا أَرَادَ اللَّهُ بِقَوْمٍ سُوءًا فَلَا مَرَدَّ لَهُ^ج وَمَا لَهُمْ

مِّنْ دُونِهِ^ق مِنْ وَّالٍ ﴿١١﴾

Allah will not change the condition of a people until they change what is in themselves. (Q.S. Ar-Ra'd : 11)

The Prophet (sallallahu alaihi wasallam) said "A single day under a just ruler (Khaleefah) is better than 60 years of ibadah"

(HR. Bayhaqi/Tabarani)

People are always learning will be very respected and strength not based
on knowledge wills collapse.

(AL-Ghozali)

Anyone who pursue the path to knowledge therein, Allah
paves the way for him to heaven (Narrated by Muslim)

Confidence is the only known antidote to failure!

(Napoleon Hill, Think & Grow Rich)

Do not always say what you know, but always know what you're saying

(Claudius)

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Surakarta, July 2011
The Writer

Binyamin

TABLE OF CONTENT

	Page
TITLE	i
DECLARATION OF RESEARCH AUTHENTICITY.....	ii
APPROVAL	iii
VALIDATION	iv
DEDICATION	v
MOTTO.....	vi
ACKNOWLEDGMENT	viii
TABLE OF CONTENT	xi
LIST OF FIGURES	xiv
LIST OF TABLES.....	xvi
ABSTRACT	xvii

CHAPTER I: INTRODUCTION

1.1. Background	1
1.2. Objectives	5
1.3. Outcomes	5
1.4. Problem Limitations	5

CHAPTER II: REVIEW OF LITERATURE

2.1. Study of Literature	7
2.2. Fundamental of Theory	9

2.2.1 Combustion Engine	9
2.2.2 Four-Stroke Engine Work	10
2.2.3 Fuel Consumption (m_f)	12
2.2.4 Carburetor System	12
2.2.5 Gasoline	19
2.2.6 The Characteristic of Hydrocarbon Fuel	20
2.2.7 Factors Influencing the Flame Speed	23
2.2.8 Exhaust Emission	26
2.2.9 The Effect of Hydrocarbon Treating.....	31
2.2.10 Molecule in Gas Phase after Heating	31
2.2.11 Hydrocarbon Treating System (HTS)	32
2.2.12 How HTS Work	33
2.2.13 Hydrocarbon Bubbler	35

CHAPTER III: RESEARCH METHODOLOGY

3.1 Flow Chart of Research	38
3.2 Tools and Materials	41
3.3 Experiment Installation	49
3.4 Sample	51
3.4.1 Engine Standard Condition	51
3.4.2 Engine Using Hydrocarbon Treating System	51
3.5 Experiment Location	51
3.6 Experiment Procedures	52
3.7 Data Analysis Layout	54
3.8 Difficulties	54

CHAPTER IV: RESULT AND DISCUSSION

4.1 Analysis of experiment result in standard condition ($Q_1 = 0$ cc/s) or without HTS applied	55
4.2 Analysis of experiment result with HTS applied, where $Q_2 = 1.5$ cc/s	57
4.3 Analysis of experiment result with HTS applied, where $Q_3 = 2$ cc/s	58
4.4 Analysis of experiment result with HTS applied, where $Q_4 = 2.5$ cc/s	59
4.5 Analysis of experiment result with HTS applied, where $Q_5 = 3$ cc/s	60
4.6 Experiment result analysis of Carbon Monoxide (CO)	62
4.7 Experiment result analysis of Unburned Hydrocarbon (UHC)	63
4.8 Experiment result analysis of Fuel consumption (m_f)	64

CHAPTER V: CONCLUSION AND SUGGESTION

5.1 Conclusion	68
5.2 Suggestion	69
BIBLIOGRAPHY	70
APPENDIX	

LIST OF FIGURES

	Page
Figure 2.1 Components of Basic Combustion	10
Figure 2.2 Cycles in Four Strokes Engine	11
Figure 2.3 Float System	14
Figure 2.4 Idle System	14
Figure 2.5 Low-Speed System in Operation	15
Figure 2.6 Vacuum Operated Power System	16
Figure 2.7 Operation of Acceleration-Pump System	17
Figure 2.8 Choke Valve Closed	17
Figure 2.9 Round-Piston Variable Venturi Carburetor	18
Figure 2.10 Effect of Mixture Strength on the Rate of Burning.....	25
Figure 2.11 Chart of CO, HC, and NO _x toward AFR	28
Figure 2.12 Molecular breakdown of the hydrocarbon mixture	32
Figure 2.13 How HTS Work	34
Figure 2.14 Bubbler Tank	35
Figure 2.15 Bubble Movement.....	36
Figure 2.16 Molecules behavior inside the catalyst.....	37
Figure 3.1 Flow Chart of Research	38
Figure 3.2 Honda Revo Engine	41
Figure 3.3 HTS Installation on motorcycle	42
Figure 3.4 Stargas Emission Analyzer	42
Figure 3.5 Bubbler Tank	43
Figure 3.6 Catalyst	43

Figure 3.7 Heat-resistant hose	44
Figure 3.8 Thermometer	44
Figure 3.9 Burret	45
Figure 3.10 Digital Tachometer	45
Figure 3.11 Stopwatch	46
Figure 3.12 Venturi Flow Meter	46
Figure 3.13 Concept Venturi Flow Meter	47
Figure 3.14 Hygrometer	49
Figure 3.15 Scheme of Experiment Installation	49
Figure 3.16 Honda Revo Engine	51
Figure 3.17 Honda Revo Engine and HTS	51
Figure 4.1 Chart of comparison among engine rotation, CO and UHC in standard condition	56
Figure 4.2 Chart of comparison among engine rotation, CO and UHC with HTS applied ($Q_2 = 1.5$ cc/s)	57
Figure 4.3 Chart of comparison among engine rotation, CO and UHC with HTS applied ($Q_3 = 2$ cc/s)	58
Figure 4.4 Chart of comparison among engine rotation, CO and UHC with HTS applied ($Q_4 = 2.5$ cc/s)	60
Figure 4.5 Chart of comparison among engine rotation, CO and UHC with HTS applied ($Q_5 = 3$ cc/s)	61
Figure 4.6 Chart of CO vs. rpm	62
Figure 4.7 Chart of UHC vs. rpm	63
Figure 4.8 Chart of m_f vs. rpm	66

LIST OF TABLES

	Page
Table 1.1 Euro Standard for Light Commercial Vehicles ≤ 1305 kg (Category N1-I), g/km	2
Table 2.1 Gasoline Properties	23
Table 2.2 Kinds, Characteristics and Effects of Exhaust Emission on Human	26

ABSTRACT

Binyamin. D700 070 006. Analysis of Hydrocarbon Treating System to The Emission of Spark-Ignition Four-Stroke Engine. Research Paper. Muhammadiyah University of Surakarta. 2011.

The reduction of carbon monoxide (CO), unburnt hydrocarbon (UHC) emission and fuel consumption on spark-ignition four-stroke engine is continuously attempted. The purposes from this research were to determine the effect of Hydrocarbon Treating System (HTS) on levels of CO, UHC and fuel consumption.

This is an experimental research. It is conducted by comparing the exhaust pollutant concentration such as carbon monoxide, unburnt hydrocarbon and also fuel consumption between standard engine setting and Hydrocarbon Treating System applied. The research variable are HTS flow rate from $Q_1 = 0$ cc/s (without HTS), $Q_2 = 1.5$ cc/s, $Q_3 = 2$ cc/s, $Q_4 = 2.5$ cc/s, and $Q_5 = 3$ cc/s. The research will be done in three conditions which are low, medium and high rotation.

The result showed that Hydrocarbon Treating System decrease fuel consumption up to 19.43% with flow rate $Q_5 = 3$ cc/s, but on the other hand it increase CO emission up to 80.84% with flow rate $Q_5 = 3$ cc/s and UHC emission level up to 124.75% with flow rate $Q_5 = 3$ cc/s from engine standard condition.

Keywords: *HTS, Carbon monoxide (CO), Unburnt Hydrocarbon (UHC) and fuel consumption*